916-86 Percutaneous Cardiopulmonary Bypass Support (PCPS) for the Treatment of Acute Fulminant Myocarditis Unresponsive to Maximum Medical Therapy

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Some acute myocarditis is refractory to conventional therapies including IABP and is rapidly culminating in death without extracorporeal circulatory support. In order to study possible effectiveness of PCPS against this subgroup, acute fulminant myocarditis (AFM), we have reviewed our experiences and have examined the clinical outcome following PCPS treatment. Since 1986, we have applied emergency PCPS to 10 AFM pts (mean 38 years) with rapidly progressive cardiac dysfunction and sustained wide QRS VT/Vf with hemodynamic collapse. The average interval from the onset of the very early signs of AFM (common cold like symptoms) to the induction of PCPS was 5.2 days. IABP was routinely applied before, during and after PCPS. Nafamostat mesilate (1 mg/kg/hr,iv) was also administered in combination with Heparin (ACT > 200 sec) as prophylaxis for bleeding complications. Histological examinations obtained from 12 endomyocardial biopsies and 2 autopsies revealed various inflamatory changes in myocardium in all of the 8 pts examined. Although the courses and degree of recovery varied among the pts, PCPS could be eventually weaned in all pts after a mean of 167 hours (ranging 37–302 hours). After the removal of PCPS, 2 old pts (>70 years) expired within 1 week due to sepsis and 1 pt expired 4 months later due to multiple organ failure. Seventy percent of pts (7 of 10) survived, 6 pts recovered to show normal cardiac function (mean EF = 0.62) and 1 pt showed DCM like chronic heart failure (EF = 0.32). Although nonsustained VT was observed in 3 of 7 survivors, they have been experiencing an event free follow-up period (mean 4.8 years).

Conclusion: Hemodynamic support by PCPS in the acute phase of AFM was shown to be an effective treatment and the long-term outcome of the survivors was shown to be excellent in the majority of the cases.

916-87 Abiomed Ventricular Assist Device as a Bridge to Transplantation

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The Abiomed BVS 5000 ventricular assist device (VAD) is simple to implant and monitor and allows for uni- or bi-ventricular support. Previous trials have demonstrated the efficacy of this device for short-term post-cardiotomy support. We report our experience using this VAD for circulatory support as a bridge to transplantation.

Twenty-six patients underwent Abiomed placement as a bridge to transplantation between January 1988 and July 1994 in three institutions. Indications included end-stage cardiomyopathy (18), post cardiotomy failure (6), and acute rejection (2). Average age among recipients was 44 years (7–60), and average duration of support was 6 days (1–13 days). Twenty-one patients received biventricular while 5 had univentricular (4 left, 1 right) support. One patient was bridged to a long-term device prior to transplantation and a second patient with a long-term support device underwent Abiomed placement for right heart failure. Complications were seen in 9 patients and included reversible (4) and irreversible (1) neurological deficits and bleeding requiring re-exploration (4). No infectious complications were seen. Following transplantation, 16 patients (62%) were discharged from the hospital and 10 patients (38%) succumbed to multisystem organ failure.

The Abiomed VAD is suitable circulatory support as a bridge to a long-term device or cardiac transplantation and is particularly useful for individuals who are too small for alternative devices or who are too unstable for long-term device placement.

916-88 Simultaneous Measurement of Left Ventricular Volume and Parasympathetic Activity During Head-up Tilt in Vasovagal Syncope

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Present study tested the hypothesis that the great decline of left ventricular volume (LVV) during Head-up tilt (HUT) triggers ventricular mechanoreceptor activation and subsequently increases parasympathetic activation associated with hypotension-bradycardia. We measured temporal changes of frequency domain heart rate variability indices (HRV) and LVV using M mode echocardiogarphy during HUT (80° up to 40 min) in 15 patients (pts, 50 ± 23 years) with syncope of undetermined etiology. HRV consisted of low (L, 0.04 Hz), high (H, 0.15–0.40 Hz) and total (T, 0.01–1.00 Hz) components. For LVV analysis, EDV, ESV and EF were calculated using Teichholtz formula. HRV and LVV indices were measured in consecutive 2 min segments throughout the study.

Results: Eight pts had positive tests (syncope was induced by HUT; Group 1, G1) and 7 pts in negative tests (Group 2, G2). Data were shown below [SBP, systolic blood pressure; mean in HR and SBP; Su, supine; Δ and Δ%, differences between values at 2 min of HUT and maximally changed values (Mx) during HUT; L/H, ratio of L and H components].

	HR (bpm)	SBP (mmHg)	ΔH	ΔL/H	Δ%EDV	Δ%ESV	Δ%EF
G1 (Su/Mx)	77/64#	117/ 79#	2.8	0.058	−53*	−49*	+23
G2(Su/Mx)	69/75#	132/124	−11.6	0.063	−19	−20	+22

*$p < 0.05$ vs G2, #$p < 0.05$ vs Su

Before syncope, LVVs in G1 gradually and more profoundly declined than those in G2. The values of H significantly increased from supine to 2 min prior to syncope in G1. Also, the values of H at 2 min prior to syncope in G1 was significantly higher than those at Mx in G2 (14 ± 7 vs. 7 ± 4 ms, $p < 0.05$).

Conclusions: Simultaneous measurements of LVV and HRV during HUT are useful for evaluating pathophysiology of neurally mediated syncope. Preceding decrease of LVV can trigger exaggerated parasympathetic activity in patients with vasovagal syncope.

916-89 Isoproterenol-induced Vasovagal Syncope: A Detailed Hemodynamic Analysis

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Usefulness of head-up tilt (HUT) ± Isoproterenol (Iso) testing in the provocation of a vasovagal response has been well recognized. Due to the invasive and intermittent nature of cardiovascular monitoring, understanding of the mechanisms underlying the HUT ± Iso-mediated reactions has been limited. By using impedance cardiography, volume clamp photoplethysmography, and internally developed computer technology, we have been able to examine noninvasively, on-line, beat-to-beat, hemodynamic parameters including: heart rate (HR), blood pressure, cardiac output, stroke volume, end diastolic volume (EDV), peak flow (PF), and peripheral resistance (PR) during HUT ± Iso testing. In this study, hemodynamic changes were examined in 10 consecutive patients (mean age 53 ± 21, range 22–84 yrs; male/female = 6/4) during an induction of a vasovagal response by HUT ± Iso testing. These changes are shown below.

Percent of Change from Baseline (supine) Parameters

Intervention	HR	EDV	PF	PR
Tilt (10 min)	8.9 ± 10.3	−14.7 ± 4.3*	−9.3 ± 7.9	53.8 ± 12.1*
Iso/Supine**	40.7 ± 15.3*	7.9 ± 6.2*	23.8 ± 8.6*	−27.2 ± 8.5*
Iso/Tilt**	67.8 ± 10.9*	−4.8 ± 5.2	23.3 ± 14.2*	−22.6 ± 8.2*
Syncope	4.6 ± 22.8	71.6 ± 20.4*	63.3 ± 22.4*	−54.7 ± 11.5*

*$p < 0.05$, ** Iso = 3 mcg/min

We interpret these findings as HUT induces a decrease in preload (EDV), an increase in sympathetic-mediated vascular tone (PR), and an insignificant change in cardiomotor tone as indirectly reflected by HR and PF. Iso blunts HUT-induced changes in EDV & PR but significantly increases PF. During HUT + Iso-provoked vasovagal response, there is a further decrease in PR but a significant increase in EDV & PF. These observations suggest: (1) Iso-mediated increase in cardiomotor tone and decrease in vasomotor tone contribute to the induction of vasovagal syncope; (2) Contrary to the conventional belief, a significant decrease in preload may not occur during HUT + Iso-induced vasovagal response.

916-90 Is Baroreflex Failure Different from Idiopathic Baroreceptor Dysfunction?

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Baroreflex failure (BRF) due to local causes was reported as a syndrome of labile hypertension, exaggerated response to cold pressor test (CPT) and elevated plasma catecholamines. We hypothesized that the pattern of autonomic abnormalities is different in the idiopathic type of BR dysfunction (BRD). Twenty four subjects (13 M: 11 F; age 62 ± 16 yrs.) with tilt-induced orthostatic hypotension (OH) were tested for: Valsalva, CPT, baroreflex sensitivity (heart rate response to acute BP alteration using Phenylephrine [PE] and amylnitrite inhalation [AN]). BRD was diagnosed by blocked Valsalva, abnormal PE and/or AN. Two groups were defined by the results of BR and tilt; 19 with BRD (OH-BRD) and 5 with normal BR (OH-NBR). They were compared to results in 31 control subjects (19 M: 12 F; age 40 ± 15 yrs.) who had normal tilt and normal BR (N-NBR). Plasma Norepinephrine (NE) was determined in supine and tilt positions. *Results:*

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